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EP 0817518 A2
EP 0467534 A2
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JP 100243120 A

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(54) Abstract Title
Allowing a wireless access user to self register to gain access to internet services over the wireless system

(57) Internet web technology is used to register wireless access customers without the of a programmable smart card or SIM (subscriber identity module) or a fixed line wired connection by providing an anonymous session connecting between a special registration web server and the user equipment. The wireless user equipment uses a predetermined temporary ID and password, the system authenticates them and establishes a point to point protocol link between the user and a registration server arrangement. On completion of registration, the registration server passes to the user a permanent ID and a permanent password for use by the user to subsequently access the system.

FIG. 1

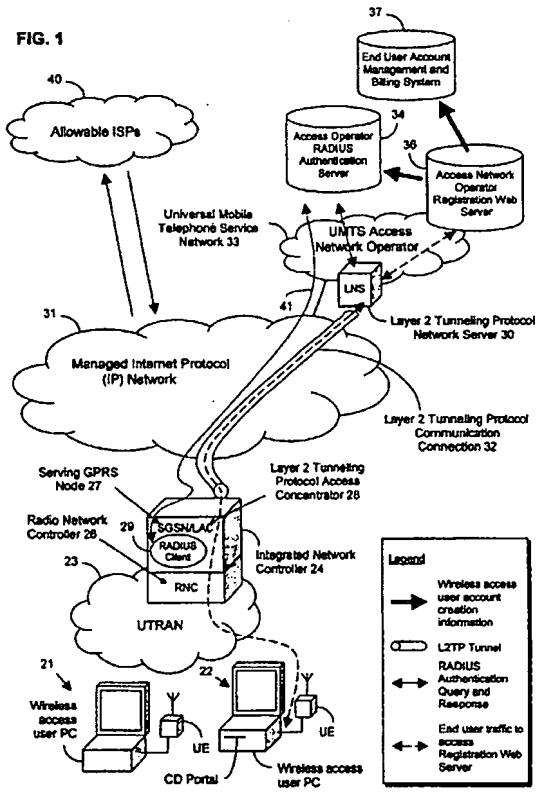

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FIG. 1

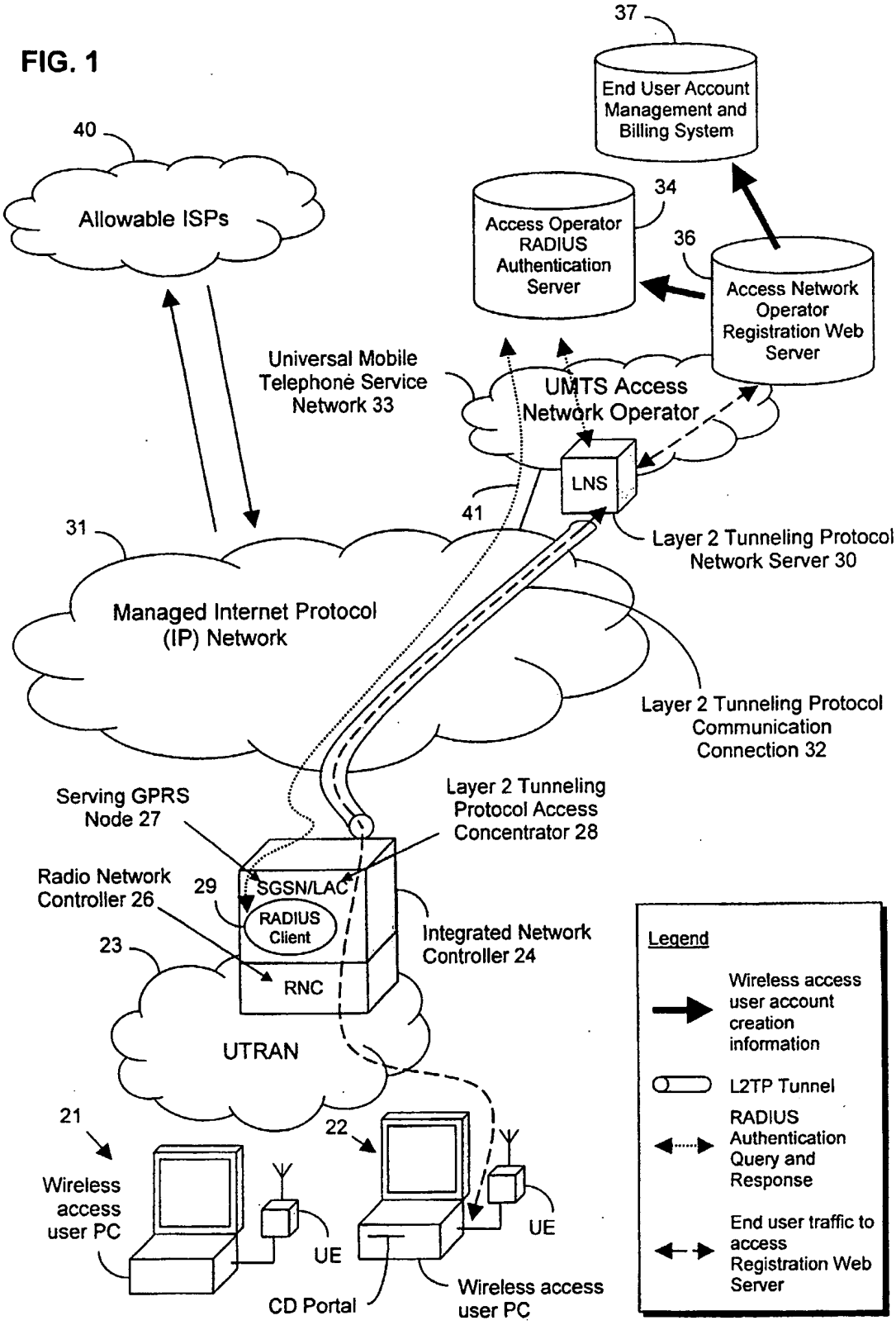

37
End User Account Management and Billing System
40
Allowable ISPs
34
Access Operator RADIUS Authentication Server
36
Access Network Operator Registration Web Server
Universal Mobile Telephone Service Network 33
UMTS Access Network Operator
LNS
41
31
Layer 2 Tunneling Protocol Network Server 30
Managed Internet Protocol (IP) Network
Layer 2 Tunneling Protocol Communication Connection 32
Serving GPRS Node 27
Layer 2 Tunneling Protocol Access Concentrator 28
Radio Network Controller 26
29
SGSN/LAC
RADIUS Client
Integrated Network Controller 24
23
RNC
UTRAN
21
22
Wireless access user PC
UE
UE
CD Portal
Wireless access user PC
Legend
Wireless access user account creation information
L2TP Tunnel
RADIUS Authentication Query and Response
End user traffic to access Registration Web Server

FIG. 2A

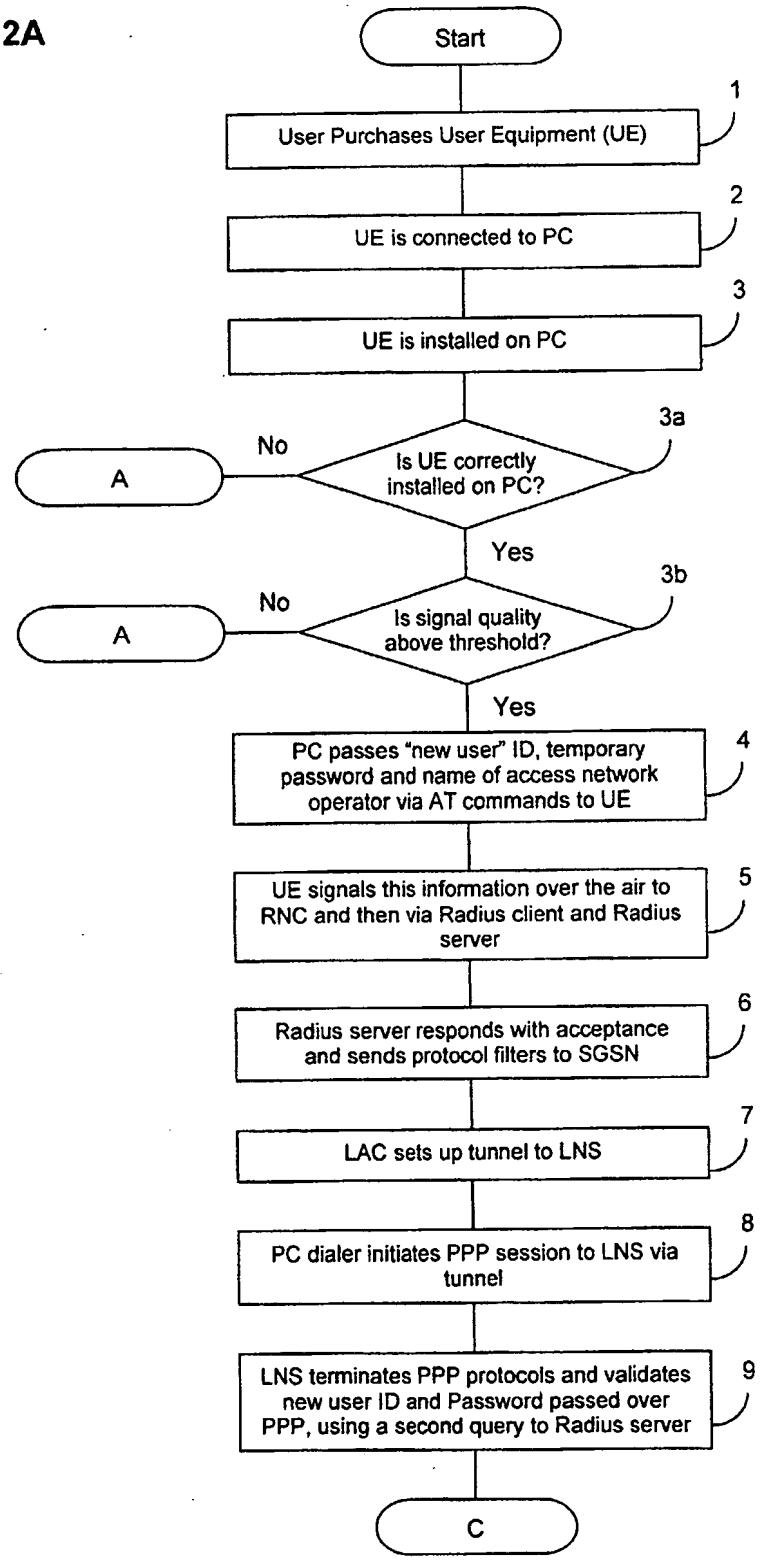
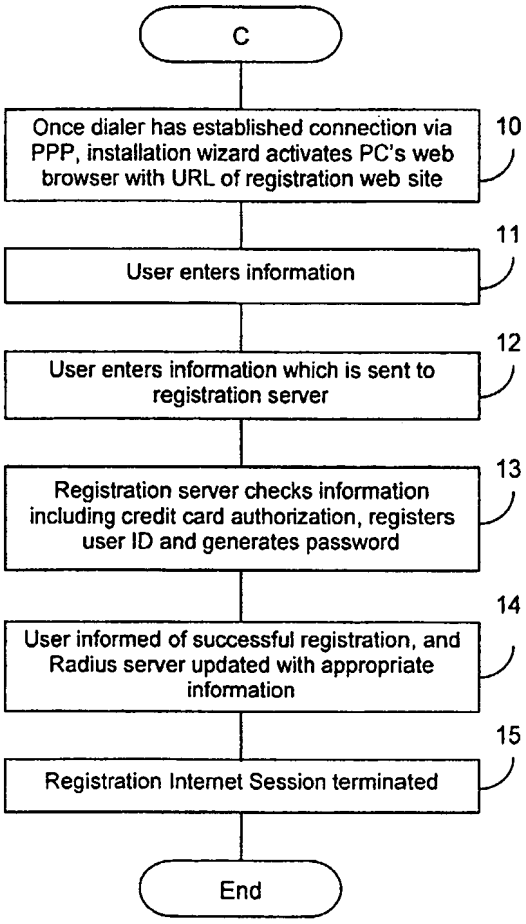

Start
1
User Purchases User Equipment (UE)
2
UE is connected to PC
3
UE is installed on PC
3a
Is UE correctly installed on PC?
No
A
Yes
3b
Is signal quality above threshold?
No
A
Yes
4
PC passes "new user" ID, temporary password and name of access network operator via AT commands to UE
5
UE signals this information over the air to RNC and then via Radius client and Radius server
6
Radius server responds with acceptance and sends protocol filters to SGSN
7
LAC sets up tunnel to LNS
8
PC dialer initiates PPP session to LNS via tunnel
9
LNS terminates PPP protocols and validates new user ID and Password passed over PPP, using a second query to Radius server
C

FIG. 2B


C
Once dialer has established connection via PPP, installation wizard activates PC's web browser with URL of registration web site
10
User enters information
11
User enters information which is sent to registration server
12
Registration server checks information including credit card authorization, registers user ID and generates password
13
User informed of successful registration, and Radius server updated with appropriate information
14
Registration Internet Session terminated
15
End

USE OF INTERNET WEB TECHNOLOGY TO REGISTER WIRELESS ACCESS CUSTOMERS

RELATED APPLICATION

U.S. patent application Serial No. 09/432,824, filed November 2, 1999, entitled "CELLULAR WIRELESS INTERNET ACCESS SYSTEM USING SPREAD SPECTRUM AND INTERNET PROTOCOL (IP)", and published in equivalent form as European patent publication EP1098539.

INTRODUCTION

The present invention is directed to the use of Internet web technology to register wireless access customers.

BACKGROUND OF THE INVENTION

The above application describes a cellular wireless Internet access system which operates in the 2 gigahertz band range to provide high data rates to fixed and portable wireless users. Such users connect to near-by base stations which in turn communicate to Integrated Network Controllers which are then connected to the Internet. Such wireless implementation relates to an access network of the UMTS (Universal Mobile Telephone

Service) and its subset UTRAN (Universal Terrestrial Radio Access Network) standards.

In order to gain service in a cellular wireless network of the types similar to the above, a sales representative at a retail location typically takes customer information credit history, etc. That information is used to create an account with a cellular service provider, with the customer information stored on the service provider's Home Location Register (HLR) or other customer database. A SIM (Subscriber Identity Mode) card is then associated with the account and placed within the cellular terminal (typically, a mobile phone or wireless Internet device).

However, both of the above techniques are cumbersome, requiring action on the part of the retailer or network service provider, and creating a time delay before a new customer can use the service. It is therefore desired to allow the user to self-register to gain access to Internet services over the wireless system as above.

SUMMARY OF INVENTION

In accordance with a first aspect of the invention, there is provided a method of registering a user in a wireless Internet access system, as claimed in claim 1.

In accordance with a second aspect of the invention there is provided a wireless user equipment arrangement for use

with a wireless access network system, as claimed in claim 10.

In accordance with a third aspect of the invention there is provided a wireless access network system, as claimed in claim 11.

In accordance with a fourth aspect of the invention there is provided a computer program element comprising computer program means for performing user registration functions in a wireless access network system, as claimed in claim 17.

In a preferred form of the invention, each user has a personal computer (PC) and each user utilizes wireless User Equipment (UE) typically with a directly attached antenna for communicating in a wireless manner with a cellular network controller. A user acquires the User Equipment along with magnetic or optical storage means (CD) having predetermined software for use in registration. A wizard in the predetermined software controls the PC and its connected wireless User Equipment.

Under the direction of the wizard in the PC, the subscriber terminal is commanded to communicate in a wireless manner with the wireless network. Because the customer has not previously registered with the wireless access network operator, it is only permitted on the network as an anonymous subscriber and is permitted to

communicate only with the network operator's registration web server. This is achieved by use of a special 'new user' ID and password pre-programmed on the CD. A communication session is established between the PC, User Equipment and the network operator's registration web server (via wireless access), and credit card, other personal details and type of service required are entered. The registration web server contains a list of allowable ISPs that can be accessed on the system. This list is used for subsequent accesses after registration has completed. The user enters a preferred User ID and if authorized by the registration server, the customer is allocated a User ID and Password; the same information is transferred to PC and the access network operator's Home Location Register (which contains the database of authorized customers). Thereafter, the subscriber is authorzed to use the network and can establish normal connections on the wireless network and to allowable ISPs (Internet Service Providers) for an Internet session and access to any part of the Internet permitted by that ISP.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an Internet system illustrating the present invention.

FIGS. 2A and 2B form a flow chart showing the operation of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to FIG. 1, two users of the Internet access system are illustrated at 21 and 22, with User Equipments, known as User Equipment (UE), 21' and 22' connected by a typical data connection to the computer using RS232, USB or Ethernet. The personal computer has a CD drive or similar media input device in which a special compact disk, or similar media, containing software including a wizard (that is, the instructional system procedures for registration) is placed. Both the UE and CD are acquired and purchased at some retail location or by mail. In any case, both the CD and the UE are at the location of the user.

The wireless access UE 21 and 22 user, as described in the above application, are a part of a UMTS/UTRAN system which by many wireless techniques (a specific novel one is described in the above application) communicates in a wireless manner as indicated by the symbol 23 to an Integrated Network Controller (INC) 24. Such controller may be connected by wireline or otherwise to an Internet Protocol (IP) network 31. As discussed in the above pending application, the Integrated Network Controller 24 includes an RNC or Radio Network Controller 26 which controls and allocates the radio network resources and provides reliable delivery of user traffic between a base station (described in the above pending application) and User Equipment (UE) and eventually the Integrated Network

Controller 24. An SGSN (Serving General Packet Radio Service Support Node) 27 provides session control and connection to the Access Operator Radius Authentication Server 34 and, lastly, LAC (Layer 2 Tunneling Protocol Access Concentrator) 28 provides the gateway functionality to the Internet Service Providers (ISP) 40 and to the registration server. A Layer 2 Tunneling Protocol Network Server (LNS) 30 terminates communication tunnels from the LAC through the IP network. The Access Operator Radius Authentication Server 34 supports the Home Location Register (HLR) functionality (described in the above pending application). The Access Operator Registration Server 36 provides the facilities for a new user to register.

The Integrated Network Controller 24 also illustrates that it includes a "RADIUS" client 29. RADIUS is a system including the software that supports centralized access control for Internet access which, as discussed above, is traditionally used where the access to the Internet is via the public switched telephone network. A description of RADIUS is provided by an article RFC 2138 Remote Authentication Dial-in User Service (RADIUS) by C. Rigney, et al., April 1997, which is available at the website WWW.IETF.ORG.

In all cases of communication of a user equipment 21 or 22 through the Internet Protocol Network, illustrated as 31, authentication is performed by the user equipment (UE) signaling the customer's wireless access

authentication information which is passed over the air to Integrated Network Controller 24 which queries a RADIUS server authentication service with the user ID (identification) and temporary password, as shown by the dotted line 41. The RADIUS server used is the Access Operator's RADIUS Authentication Server 34 which communicates with the Integrated Network Controller via the IP network using UDP/IP protocols with additional protocol layers for security.

In the case of a new user, a 'new user' ID and temporary password, preprogrammed in the CD software is signalled to the Access Operator's RADIUS Authentication Server 34 via the INC 24. The Access Operator's RADIUS Authentication Server 34 recognizes the user as a 'new user' and communicates a set of protocol filters to the INC 24 that results in a PPP (Point-to-Point Protocol) session being set up between the User's PC and the Access Operator's Registration Server 36 via the Layer 2 Tunneling Protocol link 32 and bars the user from accessing any other service. The Access Operator's Registration Server 36 is connected to the subscriber account management and billing system 37.

Thus, the foregoing constitutes the anonymous session link where a general or non-authenticated user can still gain access to the wireless access operator's registration server for the purpose of new-user registration. The accompanying legend indicates the various paths. A UMTS access licensed operator

33provides the special servers 34 and 36 along with the billing system 37.

The flow charts of FIG. 2 aptly describe the operation shown in the block diagram system of FIG. 1. After Start, in Step 1, the user purchases the equipment which has been defined as the user equipment (UE) and a CD with the appropriate software and wizard procedure installed on it. A manual is also provided. The CD also contains, besides the installation software, the required software drivers. The user residence when the user purchases the foregoing may be checked for coverage via use of the user's zip code or other geographic information. This information can all be provided by Internet web access.

In Step 2, the User Equipment is connected to the PC. This connection can be USB, Ethernet, RS 232, etc., as illustrated in FIG. 1.

In Step 3, the User Equipment is installed on the PC. This is done through the wizard software and will support all the connection interfaces specified; that is, the RS 232, USB or Ethernet. Steps 3a and 3b are precautionary checks. In Step 3a, the UE installation software checks that the modem is connected correctly and operational. If no return is made because of a failed process installation, designated by the step A, a cell search is performed in the next Step 3b. Here, the User Equipment received signal quality is measured and reported to the user via the installation wizard. Again, if the quality

of the signal fails, a return is made to Start. In effect, registration will not be possible.

In Step 4, the user equipment, under the standard "attention" (AT) modem sends new user ID and and temporary password to the UE. Then in step 5 the UE sends this authentication information over the air to the RNC 26 which is passed on the Radius Client 29 and the SGSN 27, which queries the RADIUS server 34 with the "new user" ID and temporary 'new user' password.
In Step 6, the RADIUS server 34 responds with acceptance plus a set of protocol filters to be applied in the SGSN 27 to the traffic for this specific registration session. The protocol filters serve to bar this user from accessing other Internet services or sites other than the predetermined registration server 36. The RADIUS server also details the ISP, in this case an ISP at the network access operator, to connect to the UMTS access operator 33 and to the registration web server 36.

Next, in Step 7, the Layer 2 Tunneling Protocol Access Concentrator 28 in the Radio Network Controller 24 sets up, as shown by the dashed line 32 in FIG. 1, a communications tunnel to LNS 30 and waits for a PPP (point-to-point protocol) connection request to come in. In Step 8, the PC "dialer" software then proceeds to initiate a PPP session which is passed to the LNS via Layer 2 Tueling Protocol for authentication. In step 9, the LNS then terminates the various protocols used within PPP for setting up the connection and validates a dial-up

"new user" user ID and password passed over the PPP. This involves a second query to the RADIUS server 34 represented by path 41.

In step 10, once the dilaer is connected to the personal computer, PC, via the PPP, the installation wizard activates the PC's web browser, which will then download a web page for registration from the Registration Web Server 36. Then, in step 11, the user is prompted to enter preferred user ID, password, credit card details, personal details, type of service required. A list of allowable ISPs supported by the Access Operator is provided as well as their specific registration software if required. Information on the types of service available is provided via the registration web page. In step 12, when the user has entered the appropriate data and "clicked to send" the information is sent to the registration server. In step 13 the registration server checks the information entered (including credit card authorization if required) and generates a permanent password. If the requested User ID has already been allocated the user will be provided with an option or requested to enter a new User ID. In step 14 the user is informed of successful registration via a web page downloaded from the Registration Web Server 36 that contains the user's name and permanent password, and the RADIUS server 34 is updated with the appropriate user information and the selected user name and password for wireless access. This is all saved on the PC for future

use. Finally, in step 15, the registration Internet session is then terminated.

The user is now registered with the Access Operator, assuming credit checks have been successful, and normal internet wireless access can be requested with a new session.

In the case of the present invention, the new customer's User Equipment (UE) sends identifying information which is a 'new user' ID and 'new user' password when requesting connection to the wireless access network. This is gained in a special anonymous connection. And, as discussed above, through protocol filters, the connection can be suitably restricted.

Thus, customers may purchase their user equipment from a retail outlet. They will then connect their equipment to their personal computer and be able to use it to gain Internet access for the purpose of registering themselves and creating their account on-line. This user initiated registration is made possible by the use of the above-described web-based Internet registration process.

WHAT IS CLAIMED IS:

1. A method of registering a user in a wireless access network system, comprising the steps of:

(a) the user establishing an anonymous communication session communicating with the network via wireless user equipment using a predetermined temporary ID and predetermined temporary password;

(b) the system authenticating the predetermined temporary ID and predetermined temporary password, and in dependence on said authentication establishing a point-to-point protocol link between the user and a registration server arrangement;

(c) the user completing registration with the registration server arrangement; and

(d) the registration server arrangement passing to the user a permanent ID and permanent password for use by the user to subsequently access the system.

2. The method of claim 1 wherein step (a) and step (c) are performed by the user running a predetermined software program on a computer to which the user equipment is connected, and the step (d) further comprises storing the permanent ID and permanent password at the computer.

3. The method of claim 2 wherein the software program resides on a portable data carrier which is inserted at the computer.

4. The method of claim 1 or 2 wherein step (c) comprises the user passing to the registration server arrangement information relating to a desired service provider.

5. The method of claim 4, further comprising the step of the registration server arrangement passing to the user information for registering with the desired service provider.

6. The method of any preceding claim wherein the system is a cellular wireless Internet access system.

7. The method of any preceding claim wherein the registration server arrangement comprises a server operating in the RADIUS standard.

8. The method of any preceding claim wherein the user equipment is portable, wherein the registration may be effected without prior registration formalities.

9. The method of any preceding claim wherein the system is a UMTS system.

10. A wireless user equipment arrangement for use with a wireless access network system, the arrangement comprising:

wireless user equipment; and

a data carrier holding a software program for running on a computer to establish an anonymous communication session via a temporary ID and temporary password, whereby a user may register by the method of any one of claims 1 to 9 without prior registration formalities.

11. A wireless access network system allowing registration without prior registration formalities, comprising:

anonymous communication session support for allowing a user to establish an anonymous communication session communicating with the network via wireless user equipment using a predetermined temporary ID and predetermined temporary password; and

a registration server arrangement for authenticating the predetermined temporary ID and predetermined temporary password, and in dependence on said authentication establishing a point-to-point protocol link between the user and the registration server arrangement for allowing the user to thereby complete registration, and for passing to the user a permanent ID and permanent password for use by the user to subsequently access the system.

12. The system of claim 11 wherein the registration server arrangement is arranged to receive from the user information relating to a desired service provider.

13. The system of claim 12, wherein the registration server arrangement is further arranged to pass to the user information for registering with the desired service provider.

14. The system of any one of claims 11-13 wherein the system is a cellular wireless Internet access system.

15. The system of any one of claims 11-14 wherein the registration server arrangement comprises a server operating in the RADIUS standard.

16. The system of any one of claims 11-15 wherein the system is a UMTS system.

17. A computer program element comprising computer program means for performing user registration functions in a wireless access network system as claimed in any one of claims 1 to 8.

18. A method of registering a user in a wireless access network system substantially as hereinbefore described with reference to the accompanying drawings.

19. A wireless user equipment arrangement substantially as hereinbefore described with reference to the accompanying drawings.

20. A wireless access network system substantially as hereinbefore described with reference to the accompanying drawings.

21. A method of operating a cellular wireless Internet access system as part of an Internet Network including registration of new wireless Internet access customers/users having a personal computers (PCs) where each user utilizes a portable user equipment with a directly attached antenna for communicating in a wireless manner with a integrated network controller, the method comprising the following steps:

the user acquires said user equipment along with magnetic storage means such as a CD having predetermined software and data for use in said registration;

connecting said terminal to said PC and installing the CD in the PC and allowing a wizard in said predetermined software to control the PC and its connected user equipment;

under the direction of the wizard in the PC, the user equipment is commanded to communicate in a wireless manner using an anonymous communications session which permits it to communicate only with a predetermined registration web server via authentication of a predefined 'new user' temporary ID and 'new user' password stored on the CD;

if properly authenticated a point-to-point protocol is set up between the PC and its associated user equipment and the registration web server, and then credit card, other personal details and type of service required are entered, the web server also having a list of allowable (Internet Service Providers) ISPs and if required their respective registration software for download;

if authorized by said server, giving to the user a permanent user ID and a permanent password and providing said user ID and password to an access operator authentication server as part of the Internet network;

thereafter, allowing a normal wireless Internet connections to said ISP for an Internet session which is authorized using customer information acquired by such registration.

22. A method as in claim 21 where said servers for said wireless Internet access system operate in the RADIUS standard, RADIUS being normally used in public switched telephone networks for dial-up Internet access.

23. A method as in claims 21 and 22 where portable wireless Internet users can register with a predetermined wireless Internet access operator without having to sign up for service at a retail outlet.

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Claims searched: 1-20

Examiner: Hannah Sylvester
Date of search: 16 March 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Int Cl (Ed.7): H04M 1/727, 3/38, 1/66, 1/274, 11/00, G06F 1/00, 3/14, 17/00, G08B 5/22, H04L 29/06, 29/08, H04Q 7/04, 7/18, 7/38, 7/22,

Other: Online: WPI EPODOC JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB2348778A	(ERICSSON)	At least: 1 and 11
X	EP0817518A2	(AT & T) see whole document	
A	EP0467534A2	(VODAFONE)	
A	JP100243120A	(CASIO)	
A	WO01/97060A2	(SONY)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.